REMARKS

By this Amendment, Claims 1, 8, 21, 25 and 30 have been amended, and new Claims 37-41 have been added, leaving Claims 1, 3-10, 21, 25, 27, 30, 31 and 33-41 pending in the application.

Reconsideration, reexamination and allowance are respectfully requested in light of the following remarks.

I. REJECTION UNDER 35 U.S.C. § 112, ¶1

Claims 1, 3-10, 21, 25, 27, 31, 34 and 35 stand rejected under 35 U.S.C. § 112, ¶1. The reasons for the rejection are stated on page 2 of the Official Action. Additional remarks are set forth at pages 19-21 of the Official Action.

Claim 1 recites the feature of "the electrode having a thickness of about 0.25 inch to 0.5 inch." The Official Action contends that the specification fails to provide support for this feature. In the paragraph bridging pages 19 and 20 of the Official Action, it is asserted that:

> [I]n response to the cited case law by applicant, the examiner acknowledges that incorporation by reference is permitted in some cases, however, mere reference to another application, patent or publication is not an incorporation by reference for the purpose of disclosure required by 35 U.S.C. 112, first paragraph. (Emphasis added).

Also, in the paragraph bridging pages 20-21 of the Official Action, it is asserted that:

> [A]s evidenced by Degner ..., conventional electrode thicknesses usually range from 0.039 to 0.787 inches, which clearly includes the recited conventional and claimed electrode thickness ranges, and therefore, it appears to be improper to rely on specific portions of a wide range of values from a referenced patent in order to overcome an incomplete original filed application as required by 35 U.S.C. 112, first paragraph. (Emphasis added).

In the Amendment filed on March 2, 2004, Applicants explained why the description at page 1, lines 8-10, of the present specification **and** the description at page 6, lines 26-29, of the present specification supports the subject matter recited in Claim 1 according to legal precedent and the relevant patent examining procedures set forth in the MPEP. Applicants' remarks pertaining to this rejection that were presented in the March 2 Amendment are incorporated herein by reference.

A. Degner Has Been Twice Incorporated By Reference

Degner has been incorporated by reference at two locations in the present specification. **First**, at page 1, lines 8-10 of the specification, it is disclosed that:

> Electrodes used in plasma processing reactors for processing semiconductor substrates such as a silicon wafers are disclosed in U.S. Patent Nos. 5,074,456 [i.e., Degner] and 5,569,356, the disclosures of which are hereby incorporated by reference. (Emphasis added).

However, the Official Action does **not** acknowledge this statement.

Second, Degner has been incorporated by reference in the present application by the following statement at page 8, lines 8-17 of the present specification:

> Alternatively, the electrode can be metallurgically or adhesively bonded to a support by any suitable technique such as that described in commonly owned U.S. Patent No. 5,074,456 to Degner et al., the disclosure of which is incorporated by reference. (Emphasis added).

Consistent with the reasoning set forth in the Official Action, any disclosure in Degner regarding electrodes used in plasma processing reactors for processing semiconductor substrates has been incorporated by reference in the present specification by this statement. This disclosure necessarily includes the dimensions

of the electrode assembly shown in TABLE 2 at column 5 of Degner, which supports the recitation of "the electrode having a thickness of about 0.25 inch to 0.5 inch" in Claim 1.

B. Legal Precedent

Ultradent Products Inc. v. Life-Like Cosmetics, 44 USPQ2d 1336 (Fed. Cir. 1997), supports Applicants' position that the entire disclosure of U.S. Patent No. 5,074,456 to Degner et al. ("Degner") has been incorporated by reference in the present specification, and thus the claimed feature of "the electrode having a thickness of about 0.25 inch to 0.5 inch" is supported by the present specification. Particularly, in Ultradent Products, the Court of Appeals for the Federal Circuit refuted the argument that only the portion of the contents of the incorporated patent that is specifically referred to in the referencing patent is incorporated by reference therein.

C. The MPEP

The MPEP also supports Applicants' position that the entire disclosure of Degner has been incorporated by reference in the present specification pursuant also to the provisions of MPEP § 201.06(c)(page 200-25 of May 2004 revision). Namely, the MPEP states that an applicant may incorporate by reference a prior application by including a statement that such application is "herby incorporated herein by reference." As such, the MPEP supports Applicants' position that Degner has been incorporated by reference in its entirety at two separate locations of the present specification.

For the foregoing reasons, withdrawal of the rejection under 35 U.S.C. § 112, ¶1, is respectfully requested.

II. ART REJECTIONS

First Rejection Under 35 U.S.C. § 103 (Claims 1, 4-10 and 30)

Claims 1, 4-10 and 30 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,074,456 to Degner et al. ("Degner") in view of JP 2-20018 ("Murai"). The reasons for the rejection are stated on pages 3-5 of the Official Action. Claim 23 has been cancelled. This rejection is respectfully traversed.

Claim 1, as amended, recites "a low resistivity silicon electrode adapted to be mounted in a plasma reaction chamber including a confinement ring which is used in semiconductor substrate processing, comprising: a silicon electrode comprising a showerhead electrode having a plurality of gas outlets arranged to distribute process gas in the plasma reaction chamber during use of the showerhead electrode, the electrode having a thickness of about 0.25 inch to 0.5 inch and an electrical resistivity of about 0.005 to 0.1 ohm-cm" (emphasis added). Support for the amendments to Claim 1 is provided, for example, at page 9, lines 19-22 and page 9, line 31 to page 10, line 1, of the specification; in Figure 5, which shows a confinement ring 217; and in Figures 6-7, which show a showerhead electrode assembly 240 including a backing ring 212.

Independent Claim 30, as amended, recites "a low resistivity silicon electrode adapted to be mounted in a plasma reaction chamber including a confinement ring which is used in semiconductor substrate processing, comprising: a silicon electrode comprising a showerhead electrode having a plurality of gas outlets arranged to

distribute process gas in the plasma reaction chamber during use of the showerhead electrode, the electrode having a thickness of about 0.375 inch to 0.5 inch and an electrical resistivity of less than about 0.1 ohm-cm ... and a graphite backing ring elastomer bonded to the electrode" (emphasis added).

As discussed in greater detail below, the claimed low resistivity silicon electrode provides unexpected advantages with respect to conventional electrodes that do not have the claimed combination of thickness **and** low resistivity. Particularly, Applicants determined that making the electrode thicker unexpectedly improves thermal uniformity and increases electrode lifetime. In addition, it has been determined that the thicker electrode can be used at higher power levels. Increasing the electrode thickness also decreases the electrical resistance of the electrode from the center to the edge. However, increasing the electrode thickness increases its resistance in the thickness direction. Applicants further determined that decreasing the electrical resistivity of the electrode unexpectedly decreases the resistance, while increasing the confinement window and the corresponding process window.

Applicants submit that Degner and Murai fail to suggest the subject matter recited in Claims 1 and 30. The Official Action states that Degner discloses a single crystal silicon electrode 12 adapted to be mounted in a parallel plate plasma reaction chamber, and further that the electrode has a thickness in the range of from about 0.1 cm to 2 cm. The Official Action acknowledges that Degner does not disclose that the electrode is a single crystal silicon electrode having an electrical resistivity of less than 0.05 ohm-cm.

The Official Action contends that Murai discloses a single crystal silicon electrode adapted to be mounted in a parallel plate plasma reaction chamber and

having an electrical resistivity of less than 0.05 ohm-cm. The Official Action alleges that it would have been obvious to modify Degner's apparatus to include an electrode having such electrical resistivity.

Applicants respectfully submit that the combination of Degner and Murai fails to suggest a low resistivity silicon electrode that comprises a showerhead electrode having the combination of features recited in Claims 1 and 30.

Degner discloses that the electrode 12 can have a thickness falling within the range of from about 0.1 cm to 2 cm (0.04 in to 0.79 in). However, the electrode thickness ranges recited in Claim 1 or Claim 30 provides unexpected results in light of Degner. Degner also fails to suggest that the electrode has an electrical resistivity of about 0.005 to 0.1 ohm-cm, as recited in Claim 1.

Murai discloses an upper electrode 2a of doped silicon. See the Abstract. Murai discloses that the electrode is doped with an element, such as phosphorus, which is intended to be doped in a wafer 1 processed in the chamber 5. The dopant changes the resistivity of the electrode. The Official Action has provided no motivation for making Degner's electrode from the doped material disclosed by Murai, which is doped for the particular purpose of doping the wafer 1.

Murai is silent regarding the thickness of the upper electrode 2a. As such, neither Degner nor Murai suggests selecting the thickness range of about 0.25 inch to 0.5 inch recited in Claim 1, or the thickness range of about 0.375 inch to 0.5 inch recited in Claim 30. Neither Degner nor Murai recognizes the cracking problem that was solved by the claimed thicker electrode. As such, these references could not have suggested a solution to this problem. See In re Shaffer, 108 USPQ 326, 329 (CCPA 1956).

Accordingly, the combination of Degner and Murai does not suggest modifying Degner's electrode to result in the low resistivity silicon electrode recited in Claim 1 having a thickness of about 0.25 inch to 0.5 inch and an electrical resistivity of about 0.005 to 0.1 ohm-cm, or the low resistivity silicon electrode recited in Claim 30 having a thickness of about 0.375 inch to 0.5 inch and an electrical resistivity of less than about 0.1 ohm-cm. Thus, the Official Action has not established a case of *prima facie* obviousness.

A. The Claimed Subject Matter Provides Unexpected Superiority Over Thinner Electrodes

Applicants have submitted herewith a Second Declaration By Jerome S. Hubacek Under 37 C.F.R. § 1.132, which provides evidence of the unexpected superiority of the claimed subject matter as compared to the prior art; namely, the claimed low resistivity, silicon electrode provides (a) a reduced center-to-edge temperature gradient; (b) an increased lifetime; (c) reduced byproduct deposition behind the electrode; (d) reduced electrical resistance; **and** (e) increased plasma confinement.

Before addressing the Hubacek Declaration, Applicants provide the following guidelines from the MPEP regarding how the evidence presented should be properly considered by the Patent Office with respect to the rejections under 35 U.S.C. § 103. As explained at MPEP § 716.02(e), page 700-262, "an affidavit or declaration under 37 C.F.R. 1.132 must compare the claimed subject matter with the **closest prior art** to be effective to rebut a *prima facie* case of obviousness" (emphasis added, citation omitted).

However, Applicants are **not** required to compare the claimed subject matter with subject matter suggested by a **combination of references** relied upon in a rejection under 35 U.S.C. § 103, as this "would be requiring comparison of the results of the invention and the results of the invention." See In re Chapman, 148 USPQ 711, 714 (CCPA 1966) and MPEP § 716.02(e)(III), page 700-263. Thus, to the extent that the position taken by the Examiner compares the results of the claimed subject matter to subject matter that is allegedly disclosed in **the combination of Degner and Murai**, or *vice versa*, such position is clearly improper. The claimed subject matter should be properly compared to the applied primary reference, i.e., Degner.

B. Reduction of Center-to-Edge Temperature Gradient of Electrode and Improvement of Showerhead Electrode Lifetime

The Hubacek Declaration explains testing procedures and results for low resistivity, single crystal silicon showerhead electrodes having respective thicknesses of 0.15 inch, 0.18 inch, 0.25 inch, and 0.35 inch. The comparative results plotted in the graph in Appendix A attached to the Hubacek Declaration show that for each applied power level, the center-to-edge temperature gradient decreases as the showerhead electrode thickness increases. Reducing the temperature gradient surprisingly reduces the probability of cracking of the electrode, especially at high power levels, such as 4000 watts.

The Hubacek Declaration also explains that increasing the showerhead electrode thickness increases the lifetime of the electrode, i.e., the number of RF hours that the electrode can be operated for without failing, i.e., cracking. The relationship between showerhead electrode thickness and the power level applied to

the electrode is plotted in the graph in Appendix B attached to the Hubacek Declaration. In this graph, Line A can be extrapolated to higher electrode thickness values to show that by increasing the showerhead electrode thickness, the electrode can be operated at increasingly higher power levels. Degner and Murai fail to recognize the unexpected advantage that thicker low resistivity electrodes can be operated at higher power levels without cracking than can thinner electrodes.

Despite these unexpected results, in the paragraph bridging pages 21-22 of the Official Action, it is asserted that these results are expected although no evidence has been cited by the Examiner regarding reducing the probability of cracking of an electrode by making it thicker. The Official Action has asserted that U.S. Patent No. 5,993,596 to Uwai et al. ("Uwai") allegedly supports the position that the test results in the Hubacek Declaration are "expected." Applicants respectfully disagree.

Uwai discloses glassy carbon electrodes attached to a metal cooling plate in a plasma reactor. Uwai discloses that such electrodes can warp during plasma processing, and that such warp prevents close contact of the electrode with a metal cooling plate attached to the back of the electrode (column 2, lines 52-61).

For the reasons stated in the Amendment After Final Rejection filed on September 25, 2004, Uwai does not suggest that the glassy carbon electrodes can provide the unexpected result of improving resistance to cracking, as is provided by the electrode recited in Claim 1.

Moreover, Claim 30 recites a silicon electrode including a silicon showerhead electrode elastomer bonded to a graphite backing ring. Applicants determined that the claimed thicker silicon electrode affects the temperature gradient across the

electrode such that the level of tensile stress at the periphery of the electrode, where the electrode contacts the backing ring, is reduced. Uwai provides no disclosure regarding this problem.

C. Reduction of Byproduct Deposition Behind Electrode and Reduction of Electrical Resistance of Electrode

The Hubacek Declaration also explains that increasing the showerhead electrode thickness increases the length of the gas passages and pressure behind the electrode. The showerhead electrode having a thickness of 0.35 inch reduces backstreaming, i.e., the deposition of particle defects behind the electrode, as compared to the electrodes having a thickness of 0.15 inch and 0.18 inch. The prior art clearly fails to recognize the advantage of thicker electrodes in reducing by-product deposition.

The Hubacek Declaration explains that increasing the thickness of the showerhead electrode decreases its electrical resistance. The Hubacek Declaration further explains that reducing the impedance path of the RF provides for a higher etch rate of substrates in the plasma reactor at a set power level applied to the electrode and, surprisingly, the etch uniformity was as good as, or better than, a lower resistance electrode, e.g., a thinner electrode. Particularly, as shown in the Table at page 14 of the present specification, reducing the impedance path of the RF results in a higher etch rate of substrates in the plasma reactor using the same gas chemistry and reactor conditions, including the same set power level applied to the electrode. These additional advantages are not recognized in the applied references.

However, regarding these further unexpected results, the Official Action contends at page 18, lines 9-12, that "such statements are largely unsupported statements that are not backed up by supplementary evidence and therefore these statements are insufficient to establish unexpected results." This assertion is incorrect, at least in light of the above-described etching results disclosed in the present specification. Moreover, the Patent Office should properly weigh these statements as part of the evidence as a whole with respect to Degner, the applied primary reference.

D. Enhanced Plasma Confinement

The Hubacek Declaration further explains that the claimed low resistivity electrode enhances plasma confinement. As discussed in the Hubacek Declaration, tests were performed using low resistivity, single crystal silicon showerhead electrodes A-D, and a standard higher resistivity single crystal silicon showerhead electrode in a plasma reaction chamber. The low resistivity showerhead electrodes had a thickness of 0.25 inch and an electrical resistivity of from about 0.005-0.02 ohm-cm. The standard resistivity showerhead electrode had a thickness of 0.25 inch and an electrical resistivity of 10 ohm-cm.

The standard resistivity and low resistivity showerhead electrodes were installed in a plasma reactor including a plasma confinement ring assembly for confining the plasma in confinement region between the showerhead electrode and the lower electrode. Each of the electrodes was tested to determine the maximum flow rate of a constituent of the gas mixture (argon) that could be used without plasma unconfinement in the plasma reactor.

The flow rate of argon was increased while maintaining the same flow rates of the other gases of the gas mixture. The test results are shown in Appendix C attached to the Hubacek Declaration. For the standard resistivity showerhead electrode, there was plasma unconfinement at an argon flow rate of less than 200 sccm. In contrast, for the low resistivity showerhead electrodes, higher argon flow rates ranging from 200 sccm (showerhead electrode D) up to 1000 sccm (showerhead electrode A) were used with stable plasma operation. The higher argon flow rates provide a larger confinement window for plasma processing operations using the low resistivity showerhead electrodes.

Appendix D attached to the Hubacek Declaration shows the measured impedance values for the low resistivity showerhead electrodes A, B and D. As shown in Appendix D, for both operating frequencies, showerhead electrode A had the lowest impedance value, showerhead electrode D had the highest impedance value and showerhead electrode B had an impedance value between that of electrodes A and D. The impedance values shown in Appendix D correlate to the plasma confinement results shown in Appendix C for the low resistivity showerhead electrodes, thereby demonstration that decreasing the impedance of the electrode improves confinement. These unexpected results are highly desirable in semiconductor processing because by improving confinement, the confinement window and the corresponding process window are increased.

Applicants submit that the combination of Degner and Murai fails to suggest the "low resistivity silicon electrode adapted to be mounted in a plasma reaction chamber including a confinement ring which is used in semiconductor substrate processing," as recited in Claim 1.

Moreover, the unexpected results set forth in the Hubacek Declaration that can be achieved by the claimed low resistivity silicon electrode are sufficient to rebut the alleged *prima facie* case of obviousness. Accordingly, it is respectfully submitted that the subject matter recited in Claim 1 is patentable.

Dependent Claims 4-10 are also patentable over the combination of Degner and Murai for at least the same reasons that Claim 1 is patentable.

Claim 30 is also patentable over the combination of Degner and Murai for reasons stated above.

Therefore, withdrawal of the rejection is therefore respectfully requested.

Second Rejection Under 35 U.S.C. § 103 (Claims 3, 21, 25, 27 and 31-36)

Claims 3, 21, 25, 27 and 31-36 stand rejected under 35 U.S.C. § 103(a) over Degner in view of Murai, and further in view of U.S. Patent No. 5,993,597 to Saito et al. ("Saito"). The reasons for the rejection are stated on pages 6-7 of the Official Action. Claim 32 has been canceled. The rejection is respectfully traversed.

Claim 3 depends from Claim 1 and recites the feature of "the gas outlets have diameters of 0.020 to 0.030 inch and the gas outlets are distributed across the exposed surface." It is acknowledged in the Official Action that Degner and Murai fail to disclose the diameter of the gas outlets as recited in Claim 3. However, it is asserted that Saito teaches this omission and that it would have been obvious to modify Degner in view of Murai to achieve the claimed invention.

Applicants submit that the applied combination of references teaches away from the claimed subject matter. First, Saito fails to suggest an electrode thickness of about 0.25 inch to 0.5 inch. In contrast, Saito discloses that the silicon sheet had

a thickness of only 5 mm (column 3, lines 13-20), which is less than 0.2 inches and thus significantly thinner than the claimed electrode thickness of about 0.25 inch to 0.5 inch. Accordingly, for this additional reason, the combination of Degner, Murai and Saito provides no motivation to select the particular thickness of Degner's electrode plate of about 0.25 inch to 0.5 inch, as recited in Claim 1. Thus, dependent Claim 3 also is patentable over the combination of Degner, Murai and Saito for at least the same reasons that Claim 1 is patentable.

Also, the applied combination of references provides no motivation to select the particular thickness of Degner's electrode plate of about 0.375 inch to 0.5 inch, as recited in Claim 30. Thus, dependent Claim 33 also is patentable over the combination of Degner, Murai and Saito for at least the same reasons that Claim 30 is patentable.

Murai not only fails to disclose the diameter of the gas outlets recited in Claim 3, but in fact does not even disclose a showerhead electrode that has gas outlets. Thus, Murai provides no suggestion to modify Degner's electrode to include the combination of features recited in Claim 3.

Saito discloses a silicon sheet that includes holes having a diameter of only 0.5 mm (column 3, lines 13-20), which is less than the diameter of 0.200 inch to 0.300 inch, as recited in Claim 3. Saito does not suggest modifying the holes to have a diameter as recited in Claim 3.

Thus, the combination of Degner, Murai and Saito fails to suggest the combination of features recited in Claim 3.

Moreover, the unexpected results set forth in the Hubacek Declaration that can be achieved by the claimed low resistivity silicon electrode are sufficient to rebut

the alleged *prima facie* case of obviousness. The results of the claimed subject matter should be properly compared to the primary reference, i.e., Degner.

Claims 34, 35 and 36 depend from Claims 1, 21 and 30, respectively. Each of Claims 34-36 recites the features of "the gas outlets have a diameter of about 0.025 inch to about 0.028 inch." Saito provides no suggestion to modify Degner's electrode to include gas outlets having the claimed diameter of about 0.025 to about 0.028 inch.

As stated at MPEP § 2143.03, page 2100-133 (May 2004 Rev.), "to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art" (citation omitted). Because the combination of Degner, Murai and Saito fails to disclose or suggest the combinations of features recited in Claims 3 and 34-36, the Official Action has not established a case of *prima facie* obviousness regarding the subject matter recited in these claims for this additional reason.

Therefore, withdrawal of the rejection is respectfully requested.

Third Rejection Under 35 U.S.C. § 103 (Claims 1, 4-10 and 30)

Claims 1, 4-10 and 30 stand rejected under 35 U.S.C. § 103(a) over Murai in view of Degner. The reasons for the rejection are stated on pages 7-10 of the Official Action. This rejection is respectfully traversed.

Murai is silent regarding the thickness of the disclosed electrode. Degner does not suggest modifying Murai's electrode to produce an electrode having a thickness of about 0.25 inch to 0.5 inch, as recited in Claim 1, or a thickness of about 0.375 inch to 0.5 inch, as recited in Claim 30.

Also, Degner discloses a *showerhead electrode assembly* 10 that has a different construction than Murai's apparatus, which does not include a showerhead electrode. The asserted modification of Murai's apparatus would require its substantial reconstruction and redesign and would substantially change its principle of operation. Furthermore, modifying Murai's silicon electrode by increasing its thickness would not achieve the claimed subject matter, but would result in a different non-showerhead electrode. A showerhead electrode would be unsuitable for incorporation in Murai's apparatus due to the particular apparatus design.

Furthermore, Murai and Degner fail to suggest modifying Murai's plasma chamber to produce an electrode comprising "a graphite backing ring elastomer bonded to the electrode, as recited in Claim 8; an electrode that is resiliently clamped to a support member by a clamping member," as recited in Claim 9; or the combination of features recited in Claim 10, in light of the different principle of operation of Murai's upper electrode, which is not a showerhead electrode.

However, in the paragraph bridging pages 22-23 of the Official Action, it is asserted that:

> In response to applicant's argument that the Murai reference is not combinable with Degner, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary references; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings would have suggested to those of ordinary skill in the art. (Emphasis added).

Applicants respectfully disagree with this position. The Official Action appears to refer to MPEP § 2145(III), page 159. However, page 160 of this **same section** further explains that:

> However, the claimed combination cannot change the principle of operation of the primary reference or render the reference inoperable for it intended purpose. (Emphasis added).

The Official Action fails to properly consider MPEP § 2145(III) in its entirety. According to this section, it is **controlling** that it is improper to modify a primary reference in a manner that changes the reference's principle of operation. Thus, because incorporating the features of Degner into Murai would change the principle of operation of Murai, the asserted modification of Murai advanced in the Official Action is improper according to MPEP § 2145(III).

For at least these reasons, the applied references do not render the claimed subject matter *prima facie* obvious.

It is asserted at page 23, first full paragraph of the Official Action that "Degner et al. does not change the principle of operation of Murai since modifying Murai with Degner et al. would still allow for Murai to be used as an electrode consistent with the teachings of Murai" (emphasis- added). Applicants respectfully disagree.

Claims 1 and 30 each recite a "showerhead electrode," which include a plurality of gas outlets arranged to distribute process gas. In stark contrast, Murai's electrode is not a showerhead electrode and does not include gas outlets. The Official Action has not stated sufficient motivation for one having ordinary skill in the art to substantially redesign Murai's electrode to produce a showerhead electrode, especially because Murai's apparatus includes a gas supply system having a gas supply tube 4 for introducing gas through the sidewall of the chamber, not through the electrode. As such, the asserted modification of Murai in view of Degner relies on hindsight derived from Applicants' present disclosure.

Also, the unexpected results presented in the Hubacek Declaration that are achieved by the subject matter recited in Claim 1 rebut any alleged *prima facie* case of obviousness. As explained above, it is improper to compare the results of the claimed subject matter to subject matter allegedly disclosed in **the combination of Murai and Degner**. Rather, the results of the claimed subject matter should be properly compared to the applied primary reference, i.e., Murai.

Accordingly, Claim 1 is patentable over the applied references.

Dependent Claims 4-10 are also patentable over the combination of Murai and Degner for at least the same reasons that Claim 1 is patentable.

The subject matter recited in independent Claim 30 is also patentable over the applied references.

Therefore, withdrawal of the rejection is respectfully requested.

Fourth Rejection Under 35 U.S.C. § 103 (Claims 3, 21, 25, 27 and 31-36)

Claims 3, 21, 25, 27 and 31-36 stand rejected under 35 U.S.C. § 103(a) over Murai in view of Degner, and further in view of Saito. The reasons for the rejection are stated on pages 10-12 of the Official Action. Claim 32 has been cancelled. This rejection is respectfully traversed.

Murai's apparatus does not include a showerhead electrode. Degner and Saito provide no motivation to modify Murai's electrode to produce a showerhead electrode, much less a showerhead electrode comprising the combination of features recited in Claim 1. Therefore, dependent Claims 3 and 34 also are patentable over the combination of Murai, Degner and Saito for at least the same reasons that Claim 1 is patentable.

Moreover, the unexpected results set forth in the Hubacek Declaration that can be achieved by the claimed low resistivity silicon electrode are sufficient to rebut the alleged *prima facie* case of obviousness. The results of the claimed subject matter should be properly compared to the primary reference, i.e., Murai.

Independent Claim 21 is also patentable for reasons discussed above. Dependent Claims 25, 31 and 35 are also patentable for at least the same reasons as those for Claim 21.

Dependent Claims 33 and 36 are also patentable for at least the same reasons as those stated above for Claim 30.

Therefore, withdrawal of the rejection is respectfully requested.

Fifth Rejection Under 35 U.S.C. § 103 (Claims 1, 3-10, 21, 25, 27 and 30-36)

Claims 1, 3-10, 21, 25, 27 and 30-36 stand rejected under 35 U.S.C. § 103(a) over Saito in view of Degner. The reasons for the rejection are stated on pages 12-16 of the Official Action. Claim 32 has been cancelled. The rejection is respectfully traversed.

Saito does not suggest an electrode having a thickness of about 0.25 to 0.5 inches. In fact, Saito discloses an electrode that is much thinner than 0.25 inch. However, it is asserted in the Official Action that it would have been obvious to modify Saito's electrode in view of Degner to have a thickness of about 0.25 to 0.5 inches.

In addition, Saito discloses silicon electrodes having an electrical resistivity of 0.0001-40 ohm-cm.

Applicants submit that Degner does not suggest modifying Saito's electrode to result in the silicon electrode recited in Claim 1, which has a thickness of about 0.25

inch to 0.5 inch. The Official Action has selected a particular portion of Degner's range, which is much higher than Saito's disclosed thickness, while disregarding other portions of Degner's range that are below or above the thickness range recited in Claim 1, such as values actually disclosed by Saito.

Moreover, the unexpected results presented in the Hubacek Declaration that are achieved by the subject matter recited in Claim 1 having a combination of thickness and electrical resistivity rebut any alleged *prima facie* case of obviousness. As explained above, it is improper to compare the results of the claimed subject matter to subject matter allegedly disclosed in **the combination of Saito and Degner**. Rather, the results of the claimed subject matter should be properly compared to the primary reference, i.e., Saito.

Thus, Claim 1 is patentable over Saito and Degner. Dependent Claims 3-10, 27 and 34 also are patentable over the cited references for at least the same reasons that Claim 1 is patentable.

Independent Claim 21 and dependent Claims 25, 31 and 35, and independent Claim 30 and dependent Claims 33 and 36 also are patentable over the applied references for reasons stated above.

Therefore, withdrawal of the rejection is respectfully requested.

Sixth Rejection Under 35 U.S.C. § 103 (Claims 1, 3-10, 21, 25, 27 and 30-36)

Claims 1, 3-10, 21, 25, 27 and 30-36 stand rejected under 35 U.S.C. § 103(a) over Degner in view of Saito. The reasons for the rejection are stated on pages 16-19 of the Official Action. Claim 32 has been cancelled. The rejection is respectfully traversed.

As acknowledged in the Official Action, Degner fails to disclose a single crystal silicon electrode having an electrical resistivity of less than 0.05 ohm-cm. However, it is asserted in the Official Action that Saito discloses this claimed feature and that it would have been obvious to modify Degner's electrode to have the recited electrical resistivity.

Applicants respectfully submit that the combination of Degner and Saito does not suggest modifying Degner's electrode plate to produce a silicon electrode having both the electrical resistivity and thickness recited in Claim 1. In light of Saito's disclosure of an electrode thickness that is much less than 0.25 inches, Saito provides no motivation to select the electrode thickness range recited in Claim 1 for Degner's electrode.

Also, the unexpected results presented in the Hubacek Declaration that are achieved by the subject matter recited in Claim 1 having a combination of thickness and electrical resistivity rebut any alleged *prima facie* case of obviousness. As explained above, it is improper to compare the results of the claimed subject matter to subject matter allegedly disclosed in **the combination of Degner and Saito**. Rather, the results of the claimed subject matter should be properly compared to the primary reference, i.e., Degner.

Thus, Claim 1 is patentable over these references. Dependent Claims 3-10, 27 and 34 are also patentable for at least the same reasons as those stated for Claim 1.

Independent Claim 21 and dependent Claims 25, 31 and 35, and independent Claim 30 and dependent Claims 33 and 36, are also patentable over Degner and Saito for reasons stated above.

Therefore, withdrawal of the rejection is respectfully requested.

New Claims

New Claims 37 and 38 depend from Claims 21 and 30, respectively, and recite an electrical resistivity of 0.005 to 0.02 ohm-cm. New Claims 39-41 depend from Claims 1, 21 and 30, respectively, and recite a plasma etch reactor comprising an electrode assembly including a confinement ring. Claims 37-41 are also patentable for at least the same reasons as the claims from which they depend.

Conclusion

For the foregoing reasons, withdrawal of the rejections and prompt allowance of the application are respectfully requested.

Respectfully submitted,

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Date: March 29, 2005

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